Calibration and Validation of MODIS and VIIRS using the Radiometric Calibration Test Site (RadCaTS)

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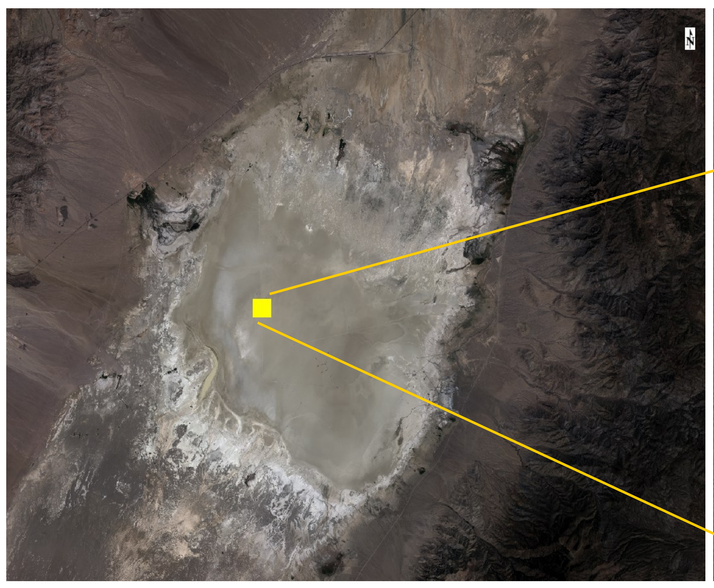
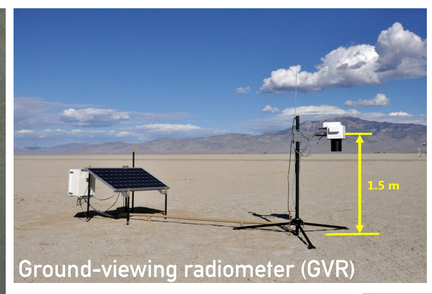
The Radiometric Calibration Test Site (RadCaTS) at Railroad Valley, Nevada, USA



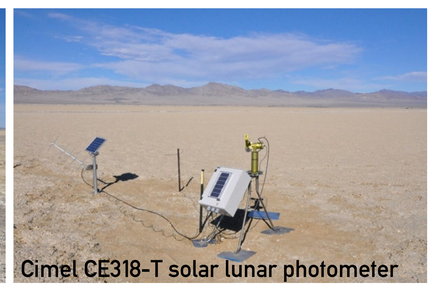
Sentinel-2A MSI image of Railroad Valley

1-km² region of interest at RadCaTS

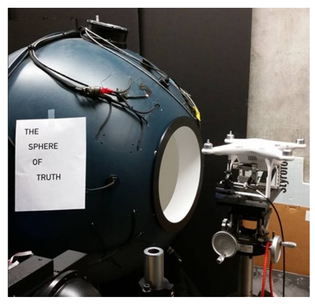


Ground-viewing radiometer (GVR)

Satellite uplink base station



Cimel CE318-T solar lunar photometer



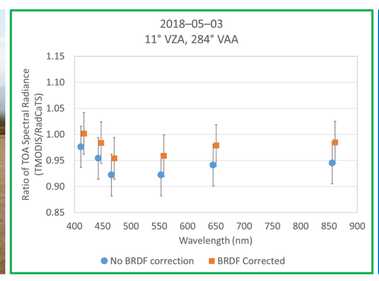
Ground instrumentation and sUAS studies of spatial uniformity

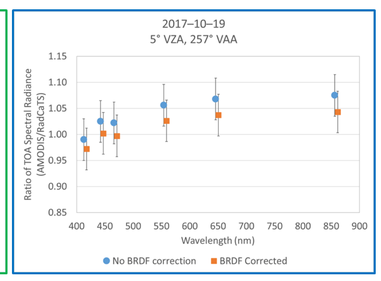
Sample of Current Projects at RadCaTS

BRDF Studies of Railroad Valley

University of Lethbridge ULGS-2

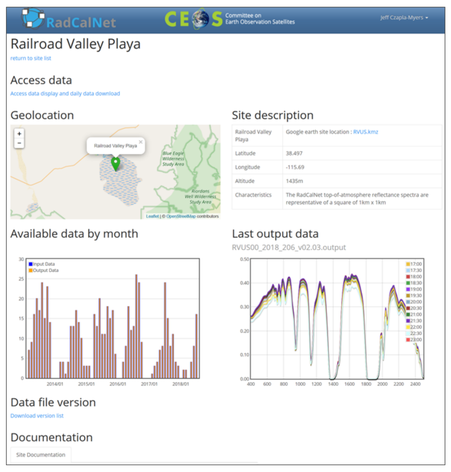
University of Arizona BRF camera

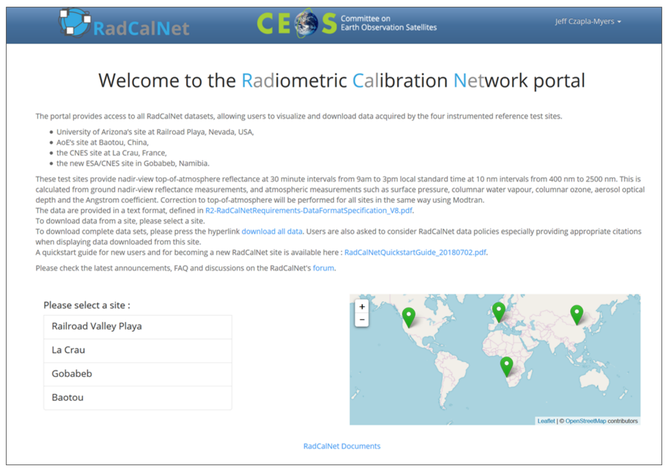




Sample results for Terra and Aqua MODIS

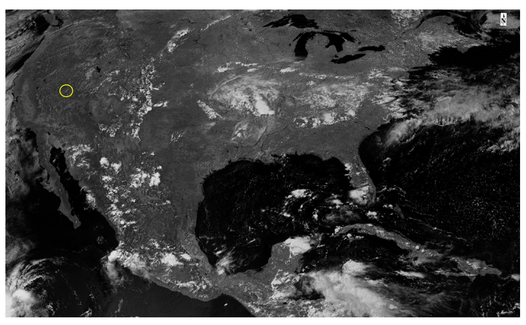
CEOS WGCV RadCalNet (www.radcalnet.org)



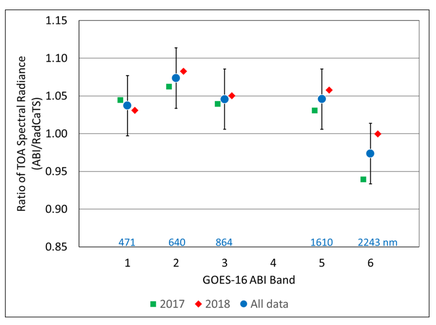


Radiometric Intercomparison of GEO and LEO Sensors

GOES-16 ABI



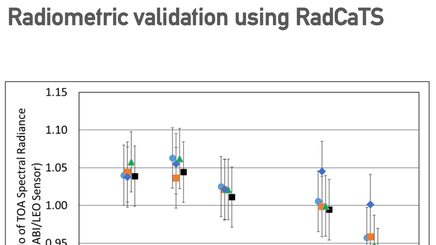
GOES-16 ABI CONUS image: 4 Jul 2017



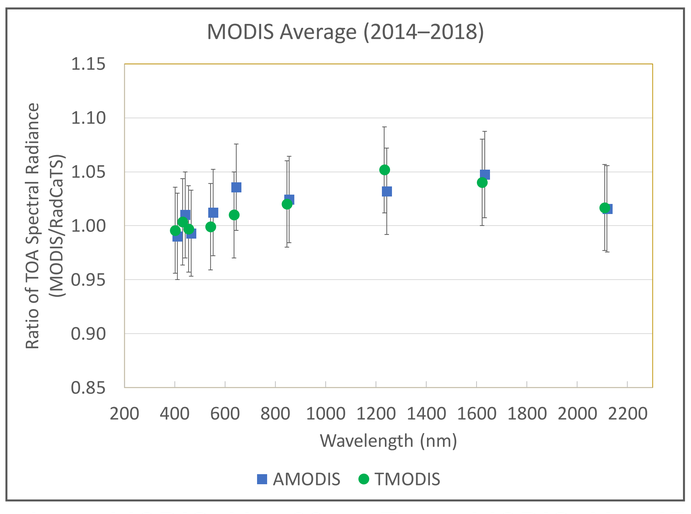
Radiometric validation using RadCaTS

Sensor	ABI Center Wavelength (nm) 471	640	864	1610	2243
	Band (Pixel size (m))				
ABI	1 (1000)	2 (500)	3 (1000)	5 (1000)	6 (2000)
TMODIS	3 (500)	1 (250)	2 (250)	6 (500)	7 (500)
AMODIS	3 (500)	1 (250)	2 (250)	6 (500)	7 (500)
S2A	2 (10)	4 (10)	8A (20)	11 (20)	12 (20)
S2B	2 (10)	4 (10)	8A (20)	11 (20)	12 (20)
L8	2 (30)	4 (30)	5 (30)	6 (30)	7 (30)

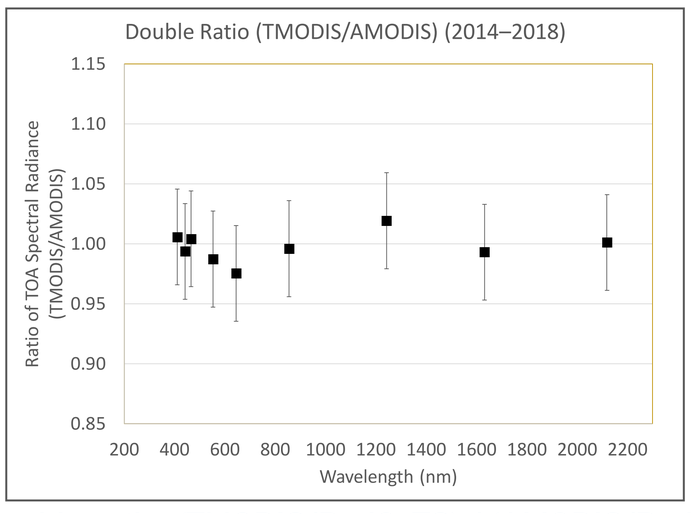
Sensor	Period	Number of Dates
TMODIS	2014–2018	45
AMODIS	2014–2018	28
S2A	2015–2018	34
S2B	2017–2018	15
L8	2013–2018	23
ABI	2017-2018	38



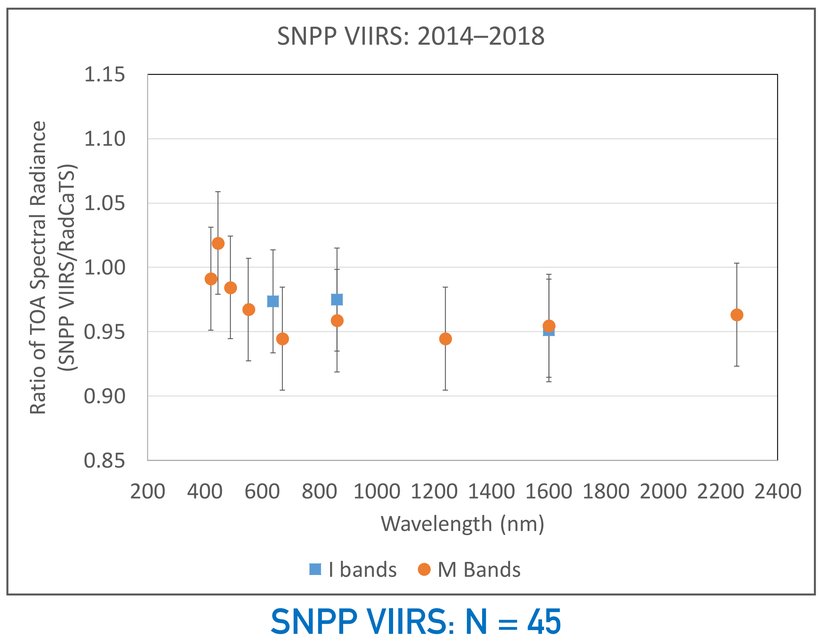
Calibration Results for Terra and Aqua MODIS, and SNPP VIIRS



Aqua MODIS: N = 28 Terra MODIS: N = 45



Double ratio: (TMODIS/RadCaTS) / (AMODIS/RadCaTS) = TMODIS/AMODIS



SNPP VIIRS: N = 45

Conclusions

- Terra and Aqua MODIS Bands 1–9 are in agreement to within ±2% (Bands 2–9), and ±3% (Band 1).
- SNPP VIIRS appears to show bias with RadCaTS.
- BRDF correction appears to be reducing bias by ~1–3% for off-nadir view angles <15°.

Future Work

- Continue with surface reflectance comparison and validation.
- Update results to include NOAA–20 VIIRS.
- Continue to evaluate the atmospheric screening used to determine 'good' vs 'bad' time.
- Integrate the BRDF correction in to the automated processing.